The Consequences of Operational Decisions on Water Quality: Reconciling Delta Smelt, Salmon, and Human Needs

#0028

Technical Panel Review

Proposal Name: The Consequences of Operational Decisions on Water Quality: Reconciling Delta Smelt, Salmon, and Human Needs

Applicant Organization: Contra Costa Water District

Principal Lead Investigator(s):
Guerin, Marianne

Amount Requested: $116,927

TSP Panel Summary of Findings:

The proposed work is highly relevant for CALFED and the 2006 PSP, and the potential outcomes could clearly and directly influence management practices (especially in bridging from high-tech to regulators and users of water). In particular, the DSM2 modeling and visualization seem relatively well thought-out and developed. However, other components of the proposed research are not very well developed and a lack of details in several sections makes the proposal difficult to evaluate (particularly sections a and b). The statistical analyses and ecological modeling are particularly poorly described. For instance, it is noteworthy that a statistician to complete some of this work is listed as TBD. Further, while relatively simple ecological models may be appropriate, it seems flawed to a priori focus upon a single measure of habitat quantity/quality as the lone predictor of population abundance. The panel expressed uncertainty that this project would provide any real new statistical data, given past efforts, but if executed correctly it could potentially expand the available data. At the same time, the budget requested is rather modest. The panel agreed that, even though parts of the project are not well-descibed, it is a highly relevant topic, especially considering the cost-effectiveness of the proposed budget. As such, the panel felt this proposal ranked sufficient, boardering on above average in its technical merrits.

Relevance to PSP Topic Areas:

High

TSP Technical Rating:
Sufficient

TSP Funding Recommendation:
Fund w/conditions

TSP Amount Recommended: $**116,927**

Conditions:

1)Clarify proposed methodology for task 2−4 2)Science Program must approve statistician for task 2.

External Technical Review #1

Proposal Title: The Consequences of Operational Decisions on Water Quality: Reconciling Delta Smelt, Salmon, and Human Needs

Proposal Number: 0028

Proposal Applicant: Contra Costa Water District

Purpose

Comments	**In general I find this proposal to be well written, clear in it's objectives, and concise. However I do have some concerns regarding the hypothesis and conceptual model. While the change in up stream flow regulations for winter run conceptually may cause changes in fall salinity, linking this change to the decline in delta smelt is not clear. Changes in the outflow regime where in full force in 1993, however the authors are attempting to draw a link to the 'recent' population decline or POD, which technically began in 2003. So I don't see the connection directly to POD. I do think think that this exercise is important respective of my comments above. Is is timely and important. The results will certainly add to our knowledge base and may give rise to new hypothesis regarding the mechanisms of the observed patterns presented.**
Rating	**Above Average**

Background

Comments	**The conceptual model does not state specifically enough, the mechanistic link between upstream flow management and the 'recent' decline (POD) of delta smelt. However, these changes may explain the decline in mean size of delta smelt in 1992−93. The model is**

	adequate for the analyses planned.
Rating	Sufficient

Approach

Comments	The approach is appropriate for the questions tested. Management tasks and administration where clearly defined. There are many products that will be of great value if the analyses bare fruit. The authors planned to dissiminate information primarily through grey literature (IEP newsletter) and the SF Estuary Journal. More effort will likely be required to publish the finding in widely distributed peer reviewed journals. DSM2 model scenarios will be available as well as GIS information. I would like to see more consideration for sharing data with data management systems.
Rating	Superior

Feasibility

Comments	Given the results that this group has produced in the past, and the proposed approach, the likelihood for useful information is high. However, linking correlations from this study and thier previous studies to mechanisms regulating winter run and delta smelt, is difficult and tenuous. The authors appear to have the expertise to conduct the research
Rating	Superior

Budget

Comments	For the potential outcome and impact of this research, this project is a bargain.
Rating	Superior

Relevance To CALFED

Comments	**This proposal thouhtfully addresses topics in this PSP as well as past CALFED topics. It will take advantage of existing information and modeling. Importantly this information will be important for CALFED resource managers.**
Rating	**Superior**

Qualifications

Comments	**Authors track record are sufficient for the study**
Rating	**Superior**

Overall Evaluation Summary Rating

Comments	**Overall, I think that CALFED will get good information from this study, and considering the price for the information, its a must fund. My only comment that I would need to add here, is that, many of these analysis should have been done by resource agencies already. I am giving this proposal and overall rating of above average. Several sections however where excellent.**
Rating	**Above Average**

External Technical Review #2

Proposal Title: The Consequences of Operational Decisions on Water Quality: Reconciling Delta Smelt, Salmon, and Human Needs

Proposal Number: 0028

Proposal Applicant: Contra Costa Water District

Purpose

Comments	**The goals and objectives of this project are clearly stated and internally consistent. The general idea, that management efforts to help one species-at-risk may hurt another species-at-risk is excellent and timely. It would have been nice if a policy expert had been included in the research team to provide a "social-management" component (i.e., why are salmon more important than delta smelt?). This latter question sounds unimportant, but it has profound implications for similar conflict situations which exist world-wide.**
Rating	**Above Average**

Background

Comments	**The conceptual model is adequately described, however the proposal appears to have been hastily put together and is lacking depth and synthesis (see below), especially with respect to the potential impacts on delta smelt. Although modifying freshwater imputs to the Delta to improve delta smelt "habitat" is a laudable goal, it has not been established that increasing habitat availability will produce significant increases in smelt population size (see Bennett 2005). Finally, it does not appear to me that the PI's have**

sufficient knowledge in fish biology and the biases of fish sampling to build a model that will clearly be of use to the user groups served by CALFED (see Qualifications). Specific comments follow below.

p3 – "... other Chinook salmon species..." –– there is only one Chinook salmon species – there are races, however.

p.4 – 2nd paragraph – "Asian clam..." there are a number of Asian clams in the Bay–Delta ecosystem, presumably the authors are talking about the overbite clam Corbula amurensis. A scientific name would have helped here.

p.4 – By p. 4 the PI's had introduced 13 acronyms making this proposal very difficult to read for someone who hasn't memorized the alphabet soup agencies/sites/phenomena in the Bay–Delta region. In addition, the acronyms differed from those used in the main review of delta smelt biology/population dynamics (i.e., Bennett 2005).

p4 – Figure 1 looks like it has a step function in the 64–92 data –– what could cause this? What effect does flooding of the Yolo Bypass have on these relationships? Also what are the error bars – 95% CI, SD, SE, etc., and with error bars that are so high for smelt abundance, how will it be possible to actually reject hypotheses? Finally, it would have been nice to know what proportion of the variance in STN is explained by salinity and what proportion

is explained by FMWT. Intuitively one would expect a strong relation between FMWT and STN given the short lifespan and moderate (not low!) fecundity of smelt and salinity may contribute minimally to explanation of the variance in STN. Bennett (2005) has shown that smelt appear to show stock−recruitment relationships, which is all this may be.

p6 − The methodology that will be used to produce statistically valid aggregated classes in the data were not described in sufficient detail for me to assess their appropriatness and rigor. The same is true for many of the other tasks − the problem is described but there is little explicit methodology for how things will be done.

p4 − An r2 of 0.41 would be considered moderate by most population biologists not "high" as claimed in the proposal−− after all most of the variation is left unexplained!

p4 − I noticed that the model in Fig. 3 has consistently over−predicted smelt abundances from 2001 onward. What is the reason for this −− it could have very important consequences if used as a management tool? In addition, the figure has no error bars nor r2 value presented − these are essential to evaluate the relationship.

p.4 − The lack of relationship between water exports and smelt population size might not be expected unless water availability was used as a covariate. It is unclear whether this was done in the

	cited analyses (I haven't looked them up, but obviously if just export is being used it is an inappropriate unique correlate). **p5 – The PI's cite salinity, turbidity and temperature as limiting factors for delta smelt but in most hydrologic systems these parameters are correlated –– they cannot be treated as independent variables.** **p6 – It would be nice if there was a statistical analysis of the FMWT and STN data to determine their biases, accuracy and precision. Neither one of these data sets nor their sampling sites nor sampling regimes were chosen to accurately sample smelt –– they were chosen to sample striped bass. In reality these sites may not even be in good smelt habitat. Everyone uses these data sets because they're the only long–term ones around, but with unknown biases and sampling efficiencies their interpretation is problematical.**
Rating	**Inadequate**

Approach

Comments	**The methodology for all aspect of the proposal are not sufficiently specific for me to assess their probability of success (see above). Consequently, it does not seem highly probable that the project will produce high quality results for CALFED clients. For example, PI's propose that it is habitat limitation that strongly affects smelt abuncance but this is one of a large number of factors that affect abundance of smelt (see Bennett 2005 and his references)**

	-- the tragedy is we have little clarity on where to start (flows would not be my first choice given that X2 (~entrainment zone) is being maintained in the right place and there is little evidence that smelt spawning takes place near the main intake structures for diversion to the south. In addition, the PI's should investigate the application of information-theoretic statistics and hiearchical Bayesian modeling to test their hypotheses/models (see recent book on multi-model inference by Ken Burnham and Dave Anderson for information-theoretic stats). The book-keeping is fine. Publishing reports and an article or two in the San Francisco Estuary and Watershed Science E-journal really aren't sufficient knowledge transfer for this kind of money. Work of this type needs to be vetted by going through the review process of at least a nationally recognized journal. This is not an unrealistic goal, as evidenced by the performance of other CALFED PI's and the papers cited in the literature cited section of the proposal (see fish papers from CAL F &Moyle's group at Davis).
Rating	**Inadequate**

Feasibility

Comments	**The approach is not fully documented - hence it is impossible to evaluate its feasibility (see comments in sections above. I would rate the likelihood of success as low.**
Rating	**Inadequate**

Budget

Comments	**No real problems although I always wonder about state agency people using CALFED money for what I assume is their salary. The standard "product" for consultants (i.e., a report to a client) is not sufficient information transfer for CALFED proposals in my opinion.**
Rating	**Sufficient**

Relevance To CALFED

Comments	**relevant**
Rating	**Sufficient**

Qualifications

Comments	**As someone who conducts both empirical and modeling research in fisheries/population ecology I am well familiar with the need for biological expertise in model construction. There will be many points in the construction of the proposed model in which assumptions will have to be made (especially given the short time span of this project) and I just don't see anyone who is an expert in delta smelt, or even fishes in general, to make informed decisions on those assumptions. Unfortunately, the vita of Dr. Guerin who appears to be responsible for performing much of the work was missing from the proposal. After checking Science Citation Index, however, I couldn't find any fish biology citations under the name M. Guerin, so presumably my comments apply to her too. Brian Pyper's salmonid modeling and general statistical qualifications are quite impressive, but that only makes some of the data analysis issues mentioned above more problematical. Most of the other PI's have few or no publications in national/international peer−reviewed journals, and their expertise appears to be providing "solutions" for regional management questions or consulting. This probably sounds snide −**

	it's just meant to be an assessment based on comparisons with PI's for other proposals that I've reviewed.
Rating	Inadequate

Overall Evaluation Summary Rating

Comments	The proposal suffers from many shortcomings including: lack of demonstrated expertise in fish biology, delta smelt biology, lack of PI's previous publications in peer-reviewed national/international journals, lack of adequate methodological detail in how the tasks will be performed, etc. Consequently, I have given it a low rating. The PI's should be encouraged to augment their team with the appropriate experts, improve on the shortcomings of the current proposal and resubmit to a future panel.
Rating	Inadequate

External Technical Review #3

Proposal Title: The Consequences of Operational Decisions on Water Quality: Reconciling Delta Smelt, Salmon, and Human Needs

Proposal Number: 0028

Proposal Applicant: Contra Costa Water District

Purpose

Comments	**The purposes of this project are clearly stated and objectives and hypotheses are internally consistent. The proponents propose to analyze historic data to a) develop relationships between between delta smelt populations and physical parameters of the Delta (salinity, temperature, and turbidity), and b) define the spatial limits of such relationships. Reviewing water management decisions, the investigators will develop and numerically model alternative management scenarios. Results of water quality modeling will be used to evaluate potential changes in delta smelt and samon populations. This research seems very timely and the methods of implementation well justified. Because the research ties into specific current debate, the results are likely to add to the base of knowledge and will certainly generate discussion of new approaches.**
Rating	**Superior**

Background

Comments	**The background for this proposal was very well presented. The conceptual model is clear and the approach is well thought out and delineated. All necessary information appears to be present and clearly laid out.**
Rating	**Superior**

Approach

Comments	**The approach is well designed and appropriate. Tasks are clearly laid out and administration of project weell defined. The investigators are deeply involved in Bay-Delta research and discussions and have widespread and effective dissemination of information planned. Results of this research will inform the entire water management community and will be of value.**
Rating	**Superior**

Feasibility

Comments	**The approach is fully documented. Because each portion of the research is clearly delineated and assigned to researchers with considerable experience in the associated aspects of the Delta, the project appears fully in their grasp. Much of the project depends on developing significant relationships and statistical relevance, so there is some possibility of failure, but the project is feasible and, even if relationships cannot be developed, will be successful in furthering discussions and scientific approaches to quantifying the trade-offs between water management and the different species at risk in the Delta.**
Rating	**Above Average**

Budget

Comments	**Each aspect of the proposed work is clearly defined and reasonably budgeted. In fact, the modeling aspects seem a little under-budgeted.**
Rating	**Above Average**

Relevance To CALFED

Comments	**This project seems like a perfect fit or the PSP in that it uses historic data, statisitcal and numerical**

	modeling, and specifically addresses issues of water managegment and both salmon and delta smelt fisheries. The project looks at the effects of environmental water management, at trends and patterns in populations and system response to changing water environment, and habitat availability and its response to change.
Rating	**Superior**

Qualifications

Comments	**The project team is very qualitifed to implement the proposed project with considerable experience and many resources.**
Rating	**Superior**

Overall Evaluation Summary Rating

Comments	**Summary: Excellent. This proposal is a nice blend of data analysis, numerical modeling, water management, and evaluation of effects on important fisheries in the Delta. This is a great use of multi-disciplinary expertise and tools. The project carries on and informs discussions that are at the forefront of Delta water management and should, at least, add solid scientific information to the evaluation of water mangement and its effects on Delta fisheries.**
Rating	**Superior**